

Appl. No. : 09/801,542
Filed : March 7, 2001

REMARKS

In response to the Final Office Action mailed December 4, 2003, Applicants respectfully request the Examiner to reconsider the above-captioned application in view of the above amendments and the following comments.

Interview Summary

Applicants would like to thank Examiner Markham for the courteous telephone interview extended to Applicants' representative, Rabinder Narula, on June 2, 2004. During the interview, the Examiner and Mr. Narula discussed the relevance of the Suntola et al. (USPN 6,015,590) reference. As explained below, Applicants argued that Suntola et al. did not disclose, teach or suggest maintaining the chamber walls at a temperature to produce a lower rate of atomic layer deposition (ALD) film growth upon the walls relative to the substrate. An agreement was not reached.

Claim rejections

Claims 35, 37, 38, 43-45 and 50-56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al. in view of Suntola et al. and Yokoyama et al. Claims 46 and 47 are rejected over the combination of Kim, Suntola and Yokoyama and in further view of Tseng. Claim 57 is rejected over the combination Kim, Suntola, Yokoyama, and Tseng in further view of Lopatin et al. Claims 35, 39-41, 43, 44, 48, and 50-56 are rejected over the combination of Kim and Eichman. Claim 42 is rejected over the combination of Kim and Eichman in further view of Kukli et al.

In these rejections, the Examiner states that the primary reference (Kim et al.) discloses a ALD reactor where the substrate support temperature is controlled independently of the reaction chamber. The Examiner admits that this reference does not explicitly teach that the substrate support temperature is maintained at a first temperature and the chamber wall is maintained at a second temperature, the difference between the two temperatures selected to maintain a lower rate of ALD film growth upon the chamber walls as compared to the substrate. To correct this deficiency, the Examiner states that Suntola and Eichman teach selecting the temperature of the chamber walls to maintain a lower rate of ALD film growth upon the chamber walls as compared

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to the substrate. As explained below, Applicant respectfully submits that the Examiner has misunderstood the teachings of Suntola and Eichman. As such, the cited combinations do not establish a *prima facie* case of obviousness. For at least this reason, Applicant submits that the pending claims are in condition for allowance.

Suntola et al. does not teach selecting the temperature of the chamber walls to maintain a lower rate of ALD film growth as compared to the substrate

As argued during the interview, Suntola et al. (U.S. Patent No. 6,015,590) does not disclose maintaining the chamber walls at a temperature to produce less ALD growth as compared to the substrate. Instead, Suntola et al. merely discloses a hot wall reactor in which an atom or molecule may become “re-vaporized”. The Examiner assumes that Suntola’s desire for “re-vaporization” means that the temperature of the chamber walls are selected to produce less ALD growth (i.e., outside the optimized ALD window). However, “re-vaporization” can take place anywhere within the ALD window. Specifically, with reference to Col. 2, lines 42-55, Suntola et al. describes a process whereby heating a wall or substrate surface promotes the “multi-shot” principle by causing species to bounce or re-vaporized off the wall or substrate. Atoms or molecules can still become re-vaporized after a monolayer of ALD deposition is formed. Accordingly, Suntola et al. does not necessarily disclose maintaining the chamber walls at a temperature to reduce ALD growth.

Specifically, Suntola uses the term “re-vaporized” interchangeably with “bounced”. See Col. 2, lines 45-48. (“[T]he species is bounced or re-vaporized so as to hit the apparatus”) As such, the term “re-vaporized” does not denote molecules vaporizing from a deposited layer. Instead, “re-vaporized” refers to molecules that remain in the gas phase and merely bounce off a via or wall. Thus the term “re-vaporized” as used in Suntola et al does not connote a reduction of ALD film.

In addition, it is not enough for the Examiner to show that reactor disclosed Suntola et al. may have resulted in less ALD growth on the chamber walls. “To establish inherency, the extrinsic evidence ‘must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill in the art. Inherency, however, may not be established by probabilities or possibilities. The

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mere fact that a certain thing may result from a given set of circumstances is not sufficient.” *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999) (citations omitted) (emphasis added). See also MPEP 2112.

Eichman teaches away from the minimization of a solid material on the walls

Eichman discloses a CVD reactor that utilizes a secondary plasma for the purpose of elevating the temperature of the wall and promoting the deposit of particular material that is easily removed and different from the material deposited on the substrate. See Col. 6, lines 9-25. As such, Eichman teaches away from reducing the amount of solid material deposited on the chamber walls.

Not obvious to modify

The Examiner states that one of skill in the art “would have readily recognized that, in a vapor deposition process in which deposition desirably occurs on a substrate (i.e., not the chamber walls), the walls of a reaction chamber should be maintained at a temperature at which the walls are not easily contaminated by any mechanism” Without accepting or disputing this characterization of the prior art Applicants submit that the Examiner is merely restating the general desire to reduce contamination on the walls of the reaction chamber. However, Applicants’ claims are directed to a more specific temperature window that was not recognized in the prior art and the Examiner has not identified any teaching or suggestion for targeting or avoiding regions of decreased or increased ALD growth within the ALD temperature window.

With respect to Suntola et al., in particular, it is worth noting that in discussing his “multi-shot” principle, Suntola is not concerned with the amount of growth on the chamber walls. Rather, Suntola is exclusively concerned with ensuring saturation of the substrate surfaces. Thus, the only applied ALD referenced to specify different temperature choices for the substrate and the wall fails to suggest the selections Applicants have claimed and the Examiner has not identified any other specific suggestion to arrive at the claimed invention.

Claims 1-30

Claims 1-30 were previously withdrawn in response to a restriction requirement. These Claims have now been canceled without prejudice.

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CONCLUSION

For the foregoing reasons, it is respectfully submitted that the rejections set forth in the outstanding Office Action are inapplicable to the present claims and specification. Accordingly, early issuance of a Notice of Allowance is most earnestly solicited.

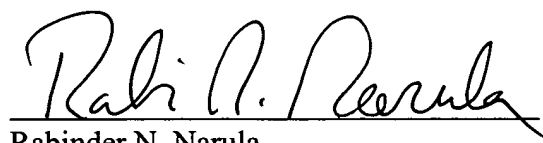
The undersigned has made a good faith effort to respond to all of the rejections in the case and to place the claims in condition for immediate allowance. Nevertheless, if any undeveloped issues remain or if any issues require clarification, the Examiner is respectfully requested to call Applicants' attorney in order to resolve such issue promptly.

Respectfully submitted,

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